



Composting in Schools

Weird and Unusual Composting

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Birds That Make Compost

by Nancy Trautmann

In Australia, there is a bird called the Brush-turkey (*Alectura lathami*) that builds compost piles to incubate the eggs so that they won't have to sit on them! They build mounds of decomposing vegetation, and the heat produced by the microbial decay maintains the eggs at about 33°C (92°F), 15°C warmer than the ambient air temperature. Because each nest generates more than 20 times the heat production of a resting adult Brush-turkey, many more eggs can be incubated this way than if they relied on warmth from the parent birds. Initially the adult birds tend the composting nest, occasionally mixing and either adding or removing vegetation as needed to regulate the temperature, which they sense through their bills. After this initial adjustment, the nests require little attention, and larger ones can stay warm for several weeks without tending.

The largest nests are on Kangaroo Island in South Australia, where the average mound measures about 12.7 cubic meters and weighs about 6,800 kg. Scientists have constructed a computer model using data on mound size, ambient temperature, and the nest's rate of heat production, water content, dry density, and thermal conductivity. The model predicts that as little as 1 cm of litter added to the mound will raise the core temperature about 1.5°C. Experiments indicate that the composting nests require (1) a critical mass of fresh litter (ca. 3,000 kg), (2) sufficient water content (> 0.2 ml/g dry material), and (3) occasional mixing of the litter.

For more information on this clever bird, see this article:

Seymour, R.S. and D.F. Bradford. 1992. Temperature regulation in the incubation mounds of the Australian Brush-turkey. *Condor* 94(1): 134-150.

Composting Drowned Turkeys

by Nancy Trautmann

Remember the massive flooding along the Mississippi River in 1993? One of the casualties of a flash flood in central Missouri that summer was a group of 20,000 turkeys!

The Missouri Department of Natural Resources advised the turkey farm owner that composting would be the easiest and safest way to dispose of the carcasses. Over 150 neighbors helped to collect the dead birds, haul sawdust from local sawmills, and build the composter. Three large round hay bales were arranged in a U-shape to provide the walls for the 60-foot-long by 5-foot tall windrow. A foot of sawdust formed the bottom layer, which was covered with alternating layers of turkey bodies (which are high in nitrogen) and sawdust (which is high in carbon).



The turkeys composted for three months, during which no problems occurred with rodents or odors. The temperature rose above 55°C (130°F) for one week during this period. The finished compost was applied to farm land as a fertilizer.

Composting Zebra Mussels

by Erin McDonnell

What are zebra mussels?

Zebra mussels (*Dreissena polymorpha*) are small mollusks which have invaded the freshwaters of North America. While these creatures are no bigger than the end of your thumb, they have turned into a big problem. They probably hitched a ride on a ship from Eastern Europe through the St. Lawrence Seaway to Lake Erie, where they found plenty of nutrients in the North American waters and decided they liked the New World. Unfortunately, there were no predators or other means of naturally limiting their growth, and they spread through the tributaries of the Great Lakes and grew prolifically in places where they were not welcome. They clogged water intake pipes for power and water treatment plants. Divers were needed to scrape them off surfaces, and then the mussels were dumped on land to be hauled to landfills. But the wet creatures, which are mostly shell, were heavy and expensive to transport and dispose of, so some folks started looking for a more beneficial way to use them; enter composting.

Why compost them?

Shells have been used to lime, or raise the pH, of soils for years, so it wasn't so far fetched to think that a useful compost could be made from Zebra Mussels. In fact, Ontario Hydro of Toronto and the Monroe Power Plant in Michigan collected zebra mussels for composting for several years. Ontario Hydro layered the zebra mussels to form windrows with debris also removed in cleaning out its pipes, periodically turned the windrows, and eventually used the compost to cover a landfill on the property. At Detroit Edison's Monroe Power Plant, the zebra mussels and debris were mixed together, piled into windrows, and eventually spread onto grounds where coal used to be piled to encourage grass growth and discourage an overwhelming population of nesting seagulls.

Cornell researchers wanted to see if they could make a recipe for folks who might want to compost anywhere from 100 to 1000 pounds of zebra mussels. Since a zebra mussel is mostly shell and hardly any organic matter, you probably need to mix mussels with some other organic material to provide the right nutrients for compost microorganisms. After a number of small tests, the researchers found that a co-composting mixture of 1:14:17:18 parts by weight of peat, sawdust, poultry litter and water could be made and then mixed 1:1 with zebra mussels for composting. An equal volume of wood chips for bulking was then added. Two compost piles were built, each containing one cubic yard of zebra mussels supplied by Rochester Gas and Electric on a bed of wood chips and perforated PVC drainage pipes. In monitoring the compost, it was observed that the shells probably help maintain good pore structure for air flow.

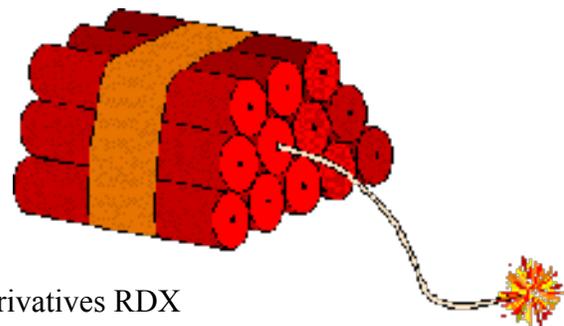
After three months of composting and maturing, the wood chips were screened out, the compost was mixed with various ratios of topsoil, and tomatoes and radishes were grown in the mixtures. All seedlings did as well or better than the topsoil alone.

What Better Way to Get Rid of Old Explosives?

by Nancy Trautmann

TNT is not the kind of substance that most people think of composting, but it can be done! At several U.S. Army depots, the water used in processing explosives was disposed of through evaporation from unlined lagoons. This has resulted in sediments and soils that are contaminated with TNT (2,4,6- trinitrotoluene) and its derivatives RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine) and HMX (octahydro-1,3,5,7-tetranitro-1,3,5,7-tetraazocine).

One way of cleaning up these sediments is by incinerating them. A less expensive and more environmentally friendly method is "bioremediation," or use of natural biological and chemical processes to degrade the contaminants. That's where composting comes in. TNT, RDX, and HMX are complex organic compounds made up of carbon, nitrogen, oxygen, and hydrogen. When combined with more conventional



compost ingredients such as manures, sawdust, straw, and fruit and vegetable processing wastes, the explosives become broken down into harmless chemical forms.

The Army is using composting to clean up munitions processing wastes at several of its ammunition plants, including ones in Louisiana, Wisconsin, and Oregon. At the Oregon site, composting is projected to save 2.6 million dollars compared with incinerating the contaminated soils. In addition to saving money, composting will also avoid the need for burning fossil fuels and will produce an end product usable for backfilling, landscaping, or erosion control.

For more information, take a look at these articles:

Williams, R.T. and C.A. Myler. 1990. Bioremediation using composting. *Biocycle* 31(11): 78-83.

Ziegenfuss, P.S. and R.T. Williams. 1991. Hazardous materials composting. *Journal of Hazardous Materials* 28: 91-99.

Biocycle staff. 1996. Clean Up at Munitions Sites. *Biocycle* 37(3): 49-50.

Compost Yourself!

These are the words to a song written by Lee Hays, a member of the Weavers, a folk group who sang in the 1940's and 50's and were blacklisted during the McCarthy era because of their "unAmerican" ideas.

If I should die before I wake,
All my bones and sinew take;
Put me in the compost pile,
And decompose me for a while.
Wind, water, rain will have their way,
Returning me to common clay!
All that I am will feed the trees,
and little fishes in the seas.
On radishes and corn you munch--
You might be having me for lunch!
And then excrete me with a grin--
Chortling, "There goes Lee again!!!"